



# UNIVERSITY *of* NEW HAMPSHIRE

## BROADBAND CENTER OF EXCELLENCE

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March 6, 2014

Filed via ECFS

Re: Expression of interest in FCC Next Generation Network Experiments in Rural America (WC Docket No. 10-90)

Marlene H. Dortch, Secretary  
Federal Communication Commission  
445 Twelfth Street, S.W.  
Washington, D.C. 20554

Dear Ms. Dortch:

The University of New Hampshire's Broadband Center of Excellence (BCoE) and the New Hampshire Broadband Mapping and Planning Program (NHBMP), in collaboration with our partners, the New Hampshire Library Association, New Hampshire FastRoads and New Hampshire Optical Systems, Inc., is pleased to submit this expression of interest in the FCC Next Generation Network Experiments in Rural America as described in WC Docket No. 10-90. We are excited about the opportunity this project presents to provide unserved communities in the state of New Hampshire with broadband connectivity along with access to the state university system, the state community college system, the state library system and the Internet.

The UNH BCoE was formed specifically to explore and promote the economic, social and technological benefits of broadband Internet access in NH and New England. Our state is sparsely populated, with many areas underserved or unserved by broadband technology. One of our charters is to look for innovative ways of finally reaching the unserved and underserved areas of our state with the same broadband capabilities many of our citizens already enjoy.

In September 2013, the UNH BCoE was selected as one of five applicants to participate in pilot deployments of Television White Space (TVWS) technology as part of the Gigabit Libraries Project, an initiative aimed at providing broadband Internet services to unserved and underserved communities through public library facilities. Our plan is to leverage the expertise we have developed in deploying TVWS technology and partner with last-mile service providers to connect unserved and underserved small municipalities in our state to the BTOP-funded fiber infrastructure in all 10 counties. Doing this will give these communities immediate access to our university, community college and state library systems and the huge resources they already provide to many of our communities.

The New Hampshire Broadband Mapping and Planning Program (NHBMP) works to improve broadband access and use in the state by inventorying and assessing broadband availability, and by engaging communities and other stakeholders in conducting planning, capacity building, technical assistance, and training initiatives. Through partnerships with UNH Cooperative Extension and NH's nine Regional Planning Commissions (RPCs), NHBMP has established Broadband Stakeholder Groups (BSGs) to identify regional broadband needs and barriers, as well as potential strategies to address those barriers, as input

for developing regional broadband plans. The stakeholder groups are comprised of a wide range of individuals including local representatives of business, municipalities, healthcare, public safety, education and residents. NHBMP is assisting the BSGs in garnering local support for finding solutions for bringing broadband connectivity to unserved and underserved communities throughout the state.

Hence, we believe our broadband programs and partners are uniquely positioned to research and support the installation of appropriate technologies for bringing broadband to underserved communities and to work with community leaders to garner the support needed for successful adoption, use and sustainability. As the only NH land-grant, sea-grant and space-grant university, research and outreach are important components of our mission for the citizens of the state. This project will develop and facilitate the partnerships necessary among multiple stakeholders for success and could serve as a model for other universities, providers, and communities across the nation.

### **Background on the submitting entities**

BCoE: UNH created a strategic, focused, interdisciplinary institution – the Broadband Center of Excellence (BCoE) – designed to establish UNH as a global leader in maximizing the effectiveness of broadband in commerce, innovation, competitiveness and quality of life. Led by cable modem pioneer Rouzbeh Yassini, UNH BCoE's strategic goals are to enable students, faculty, researchers, communities and corporations to utilize broadband as a tool to produce high-quality research and economic opportunity while reducing costs and increasing connectivity for new services supported by broadband.

NHBMP: The New Hampshire Broadband Mapping and Planning Program (NHBMP), established in January 2010, works to improve broadband access and use in the state by assessing broadband availability, and by engaging communities and other stakeholders in conducting planning, capacity building, technical assistance, and training initiatives. The program has 4 main components:

- Mapping – which collects Internet service provider data to provide maps to legislators, community officials, businesses, stakeholders, and residents to frame public discussions and to plan for enhanced broadband availability;
- Planning – helps communities understand the importance of broadband availability and is developing regional broadband plans to be integrated into a statewide broadband plan;
- Technical Assistance and Training – assesses broadband training and technical assistance needs of stakeholder groups including educational institutions, municipalities, small business, and healthcare providers, and designs and delivers training; and
- Capacity Building and Community Resources – work with communities to increase broadband adoption and deployment on a community-by-community basis, collaborating to create best-case practices in Policy, Management, Financial Resources, and Advocacy for Business and Residential broadband.

NH FastRoads: New Hampshire FastRoads (NHFastRoads) is a wholly owned subsidiary of the Monadnock Economic Development Corporation (MEDC) bringing a modern broadband telecommunications infrastructure to the region that meets or exceeds the speed and bandwidth goals of the FCC National Broadband Plan. NHFastRoads is an open access, middle mile and last mile network that aggregates demand for the entire region, including community anchor institutions, large and small businesses, government offices and agencies, and residents. The routes provide middle mile fiber to 22 communities and 120 community-anchor institutions in the NHFastRoads region, and last mile fiber connections to over 1000 businesses and residents.

The NHFastRoads network is designed to support a carrier class, fully redundant, self-healing core backbone capable of handling the bandwidth requirements required by higher education, health care, businesses, and local government, including DWDM lightpaths and GigE, 10GigE, 40GigE circuits and

beyond. The NHFastRoads network is connected to the larger New Hampshire Optical Systems-managed fiber network connecting all 10 counties in NH through a Broadband Technology Opportunities Program (BTOP) grant.

**New Hampshire Optical Systems:** New Hampshire Optical Systems, Inc. (NHOS) is an ETC Organization that provides last mile connectivity with dark fiber, and with its sister company, 186 Communications, both based in Nashua, NH, operates and maintains a fiber optic network serving local, national, and global broadband providers and enterprise customers. The core of the 1,000 mile Northeast network is operated from a 30,000 square foot facility in Nashua, and is fed by diverse connections throughout New England and into Canada, forming a high-capacity communications corridor designed and built to serve customers. Both organizations are positioned to revolutionize the industry as the region's premier Fiber Solutions Provider (FSP).

### **Service area for the experiment**

Our proposed service area for the FCC program experiment are likely to involve the identified service areas, including US Census block numbers and relevant information for consideration:

#### **9025 Bethlehem, NH**

**Bethlehem** is a hillside town in Grafton County, New Hampshire. The population was 2,526 at the 2010 US Census. Home to Cushman and Strawberry Hill state forests, the eastern half of the town is within the White Mountain National Forest (WMNF). The Appalachian Trail crosses in the south. The main village of the town, where 972 people resided at the 2010 US Census, is defined as the Bethlehem Census-designated place (CDP), and is located at the junction of U.S. Route 302 with New Hampshire Route 142. The town also includes the villages of Maplewood and Pierce Bridge.



- Schools: Bethlehem Elementary School K-6; Woodland Community School K-8; Profile School 7-12; White Mountain School small 9-12 and PG;
- Library: Bethlehem Public Library;
- Other CIAs: North Country Council (Northern New Hampshire's regional planning commission); Bethlehem Police and Fire Departments;
- Broadband Stakeholders Group: active NHBMP Broadband "ready" community group.

#### **5015 Dublin, NH**

**Dublin** is a town in Cheshire County, New Hampshire. At the 2000 US Census, there were 1,476 people, 560 households and 417 families residing in the town. The population density was 52.7 per square mile. Dublin is the base for Yankee Publishing Inc., the publisher of the Old Farmer's Almanac and Yankee magazine. The northern slopes of Mount Monadnock occupy the southern part of town. The highest point in Dublin is along Monadnock's northeast ridge, where the elevation reaches 2,834 feet (864 m) above sea level at the town line. The town is crossed by New Hampshire Route 101 and New Hampshire Route 137.



- Schools: Dublin Christian Academy K-12; The Dublin School private high school (130 students);
- Library: Dublin Public Library;
- Other CAIs: Dublin Police and Fire Departments;
- Broadband Stakeholders Group: active NHBMP Broadband "ready" community group.

### **7145 Northumberland/Groveton, NH**

**Groveton** is a Census-designated place (CDP) in the town of Northumberland in Coos County, New Hampshire. As of the US Census of 2000, there were 1,197 people, 514 households, and 323 families residing in the CDP. The population density was 550.6 people per square mile. There were 558 housing units at an average density of 256.7 per square mile. It is located at the intersection of U.S. Route 3 and New Hampshire Route 110. The paper mill, which was the primary employer in Groveton, was closed by Wausau Papers in 2008.

- Schools: Groveton Elementary School; Groveton High School;
- Libraries: Groveton Public Library; Northumberland Public Library;
- Other CAIs: Groveton Police and Fire Departments.



### **List of Anchor Institutions**

The community anchor institutions that we would connect are included in the community profiles above.

### **Proposed technology**

A comprehensive assessment of each community will be conducted to determine the most cost effective, robust, and sustainable technologies to be deployed that include a combination of fiber, wireless, broadband over powerlines, and TVWS. Our envisioned plan would connect community anchor institutions including municipal buildings, libraries and schools as well as in-town buildings with fiber connecting to the NHFastRoads middle mile fiber backbone and outlying homes with wireless technology, most probably one based on TVWS spectrum.

TVWS represents one of the few technologies that have the potential to economically deliver broadband access to unserved high cost communities in New Hampshire. This experiment is an opportunity for them to introduce cost-effective rural broadband wireless Internet access and has the potential to attract the interest of regulators, service providers and investors in our state. TVWS would provide the last mile connectivity and would connect to the existing and operational multi-gigabit fiber ring installed around the state of NH.

The three proposed communities have significant TVWS spectrum availability to provide last mile connectivity to homes and buildings:

- **Bethlehem, NH:** 21 channels, 126 MHz available
- **Dublin, NH:** 14 channels, 84 MHz available
- **Northumberland/Groveton, NH:** 20 channels, 120 MHz available

### **Existing Providers**

According to data reported by Internet Service Providers (ISPs) to the NHBMP, the following companies offer Internet access services in some but not all parts of the proposed areas at varying price points and connectivity speeds. Based on results of the NHBMP Broadband Survey and Speed Test program the connection speeds in these areas vary significantly and indicate that in many instances available upload and download speeds are less than what is considered broadband. In addition many parts of these areas are considered economically disadvantaged and in many instances are not financially capable of connecting to an existing ISP.

- **Bethlehem:** AT&T Mobility LLC, FairPoint Communications, Inc., G4 Communications, Time Warner Cable, U.S. Cellular, Verizon Wireless
- **Dublin:** AT&T Mobility LLC, Comcast, FairPoint Communications, Inc., G4 Communications, Granite State Telephone, Spectra Access, Sprint, T-Mobile, Time Warner Cable, U.S. Cellular, Verizon

Wireless, WiValley

- **Groveton:** AT&T Mobility LLC, FairPoint Communications, Inc., G4 Communications, GAW High-Speed Internet Inc., Time Warner Cable, U.S. Cellular, Verizon Wireless, Wireless LINC of NH and VT

### **Contemplated service offerings**

Our goal is to enable the socio-economic development of unserved and underserved areas by connecting them to the Internet using the most cost effective, robust, and sustainable broadband technologies available, including TVWS and fiber to the home. Our primary goal is to connect these areas to our university, community colleges and state libraries and our health care system. Based on financial modeling, we will likely offer multiple speed tiers, but in all cases, make sure the offered service is affordable for each connected home and institution.

### **State and/or local participation and support for project**

Each community identified in the experiment above has an existing, active broadband stakeholder group (BSG) that is well-connected to the community leadership, which we believe will be significantly supportive in driving interest and support for each experiment. Our development team will engage the community in planning and other discussion around the concept to garner the input of the community in the design phase, much like a design charette. Our experience is that if the community is strongly behind the trial, then local government will be far more inclined to actively support the project. Our efforts associated with the State Broadband Initiative, funded by the US Department of Commerce, in the area of broadband planning places our project proposal months forward as a result of the community research and support already introduced.

### **Funding Requirements**

As part of our comprehensive response during the formal proposal stage we will provide a detailed costing model for each of the selected communities that includes the capital and operational expenses necessary to make the costs to the community cash neutral while providing an affordable service to the connected citizens.

Based on preliminary costing we have done for a TVWS deployment, the capital equipment cost to connect 500 households in a 15 square mile area consisting of urban, suburban and rural households centered around a community anchor institution would be approximately \$250,000 dollars, not including client-side equipment (anticipated to be approximately \$500 per home connected). Additional costs that could be incurred include added base station locations necessary due to topography. Per-mile fiber costs in New Hampshire, as identified in the recently completed BTOP grant, average approximately \$50,000 to connect community anchor institutions (CAI) with aerial attachments, which would be necessary if the desired TVWS base station CAI was without the appropriate level of aggregate bandwidth to support the community area.

Thank you for considering our Expression of Interest in your decisions about the amount of funding that will be allocated in the Rural Broadband Trials. We commend you in this effort to connect rural communities and are ready to help you close the digital divide.

Sincerely,

Rouzbeh Yassini, PhD  
Executive Director